



BUSADMIN O712
Data Analytics with Python
Fall 2026 Course Outline

Operations Area
DeGroote School of Business
McMaster University

COURSE OBJECTIVE

The objective of this course is to equip students with the knowledge and skills to use the Python programming language, modern AI tools and analytics methods to address managerial problems in different business contexts. Students will learn to acquire, prepare, explore, and analyze data; select and implement appropriate analytics techniques; evaluate model performance and limitations; and translate analytical results into actionable managerial insights. Through hands-on work with real and simulated datasets, students will also develop an understanding of the responsible and effective use of AI tools to support coding, data analysis, model development, interpretation, and communication of results.

INSTRUCTOR AND CONTACT INFORMATION

11:30am to 2:20pm, Tuesday

Dr. Yun Zhou

Instructor

zhouy185@mcmaster.ca

Office: DSB-428

(Main Campus)

Office Hours: By Appointment

Tel: (905) 525-9140 x27549

Class Location: See Mosaic

TA: TBA

Course website: Avenue to Learn

COURSE ELEMENTS

Credit Value: 3	Leadership: Yes	IT skills: No	Global view: Yes
Avenue: Yes	Ethics: No	Numeracy: Yes	Written skills: No
Participation: Yes	Innovation: Yes	Group work: Yes	Oral skills: Yes
Evidence-based: Yes	Experiential: No	Final Exam: No	Guest speaker(s): Maybe

COURSE DESCRIPTION

This course is offered in the format of in-person lectures. Course materials will include lecture notes/slides, Python scripts, Jupyter notebooks, etc. students will work through the analytics lifecycle — from acquiring and preparing data to developing, evaluating, and communicating analytical solutions.

Major topics of the course include:

- **Python Basics for Business Analytics:** Core data structures, essential libraries (NumPy, pandas), notebooks, and AI-assisted coding workflows.
 - **Data Acquisition:** Obtaining business data from files, databases and the web.
 - **Data Preparation and Cleaning:** Handling missing values, de-duplication, joining sources, and transforming variables so that analysis rests on a defensible dataset.
 - **Data Visualization and Communication:** Building charts and interactive visuals that surface patterns and convey findings to non-technical decision makers.
 - **Predictive Analytics:** Regression and classification, model selection and validation, and reading model output for what it implies about the business decision.
 - **Pattern Recognition and Diagnostics:** Detecting unusual or changing patterns, and finding what caused them.
 - **From Prediction to Decision:** An introduction to what-if analysis and data-informed optimization, linking analytical output to managerial action.
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LEARNING OUTCOMES

Upon completion of this course, students will be able to complete the following key tasks:

- Acquire, prepare, clean, and transform business data for analysis using Python.

- Build charts and interactive visualizations that explore data and communicate managerial insight.
- Develop and evaluate predictive and forecasting models using appropriate validation methods and performance measures.
- Detect anomalies and shifts in business performance, and evaluate competing explanations for what caused them.
- Translate analytical predictions into introductory prescriptive recommendations using what-if analysis and optimization concepts.
- Use AI-assisted coding and analytical tools effectively and responsibly, verifying the accuracy, limitations, and reproducibility of their outputs.
- Communicate analytical methods, findings, limitations, and actionable recommendations to both technical and managerial audiences.

REQUIRED COURSE MATERIALS AND READINGS

Avenue registration for course content, readings and case materials

- <http://avenue.mcmaster.ca>

Selected articles, documentation, and online resources

\$ FREE

\$ Free or free-tier
access available

EVALUATION

Your grade is built from continuous work across the term rather than a single final examination. Assignments keep you current with the material, the group project asks you to carry one business problem through the full analytics lifecycle, and the midterm confirms individual command of the core methods.

Components and Weights

Participation and In-Class Exercises	Individual	20%
Individual Assignments (4 × 6%)	Individual	24%

Group Project	Group	31%
Midterm Exam (Week 9, November 3)	Individual	25%
Total		100%

Grade Conversion

At the end of the course your overall percentage grade will be converted to your letter grade in accordance with the following conversion scheme:

LETTER GRADE	PERCENT	POINTS
A+	90-100	12
A	85-89	11
A-	80-84	10
B+	77-79	9
B	73-76	8
B-	70-72	7
F	00-69	0

Course Deliverables

Individual Assignments (24%, individual work)

There are four individual assignments, each worth 6% of your final grade. They are designed to keep you current with the course material and to give you hands-on practice between class sessions. Due dates will be posted on Avenue to Learn.

Late assignments will be penalized by 10% per day except under extraordinary circumstances. Please discuss any extenuating situation with your instructor at the earliest possible opportunity.

Participation and In-Class Exercises (20%, individual work)

Participation is assessed on attendance, asking and answering questions, contribution to class discussion, and completion of the hands-on exercises worked through during class time.



You must have a **name card with your full first and last name** clearly written and displayed in front of you for every class, which will be used to help give credit for your participation.

Group Project (28%, group work)

The project is completed in groups, with all members receiving the same mark. Groups will take a business problem of their choosing through the full analytics lifecycle — framing the question, acquiring and preparing data, building and evaluating a model, and delivering a recommendation to a managerial audience. Detailed requirements will be announced at the beginning of the term. Presentations take place in the final two class sessions and the written report is due on the date posted on Avenue to Learn. Late submissions will not be accepted.

Midterm Exam (28%, individual work)

The midterm examination is written during class time on Tuesday, November 3 (Week 9). It covers all material up to and including that date. Format and permitted aids will be announced on Avenue to Learn.

COMMUNICATION AND FEEDBACK

Students that are uncomfortable in directly approaching an instructor regarding a course concern may send a confidential and anonymous email to the respective Area Chair or Associate Dean:

<http://mbastudent.degroote.mcmaster.ca/contact/anonymous/>

Students who wish to correspond with instructors or TAs directly via email must send messages that originate from their official McMaster University email account. This protects the confidentiality and sensitivity of information as well as confirms the identity of the student. Emails regarding course issues should NOT be sent to the Administrative Assistant.

Instructors are encouraged to conduct an informal course review with students by Week #4 to allow time for modifications in curriculum delivery. Instructors should provide evaluation feedback for at least 10% of the final grade to students prior to Week #8 in the term.

ACADEMIC INTEGRITY



You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at:

www.mcmaster.ca/academicintegrity

Students are responsible for being aware of and demonstrating behaviour that is honest and ethical in their academic work. Such behaviour includes:

- following the expectations articulated by instructors for referencing sources of information and for group work;
- asking for clarification of expectations as necessary;
- identifying testing situations that may allow copying;
- preventing their work from being used by others (e.g., protecting access to computer files); and
- adhering to the principles of academic integrity when conducting and reporting research.

AUTHENTICITY/PLAGIARISM DETECTION

The course use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software.

All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to www.mcmaster.ca/academicintegrity.

COURSES WITH AN ONLINE ELEMENT

All courses use some online elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course.

Students may be required to use the Respondus LockDown Browser and Respondus Monitor. The Respondus LockDown Browser is a downloadable program that allows a student to take an Avenue to Learn quiz in a secure environment. Quizzes can be set to use LockDown Browser or LockDown Browser.

For more details about McMaster's use of Respondus Lockdown Browser please go to <https://avenuehelp.mcmaster.ca/exec/respondus-lockdown-browser-and-respondus-monitor/>

The available information is dependent on the technology used. Continuation in a course that uses online elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure, please discuss this with the course instructor.

ONLINE PROCTORING

The course may use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

CONDUCT EXPECTATIONS

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities](#) (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online.**



It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx, Teams, or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

ATTENDANCE

Arriving late or missing class disrupts the learning experience for both you and your peers. Punctuality and attendance are crucial to maintaining a respectful, professional and productive environment for everyone, including our faculty.

Instructors may use Top Hat in their course in a variety of ways, including to capture attendance in their classes. Attendance is recorded by submitting a unique 4-digit code displayed in your physical classroom using your personal device.

MISSED ACADEMIC WORK

Missed Mid-Term Examinations / Tests / Class Participation

Please do not use the online [McMaster Student Absence Form \(MSAF\)](#) as this is for Undergraduate students only. The MBA program will not accept an MSAF.

When students miss regularly scheduled term work which contributes 10% or more to the final grade, for legitimate reasons as determined by the [DSB Student Services – Academic Office](#) (DSSAO (DSB Student Services Academic Office)), the activity necessary to compensate for the missed work will be determined by the course instructor. The compensatory activities assigned will vary with the nature of the course and the missed requirement. They include, but are not restricted to, an alternative assignment, a rescheduled midterm exam, or re-weighting the marks for the missed component to other mark components. Documentation explaining such missed work must be provided to the DSSAO (DSB Student Services Academic Office) **within five (5) working days** of the scheduled date for completion of the work.

Acceptable reasons for missed work, along with the [Petition for Missed Term Work](#) and the [MBA Student McMaster University Student Health Certificate](#), can be found on the DeGroote MBA Student

website (mbastudent.degroote.mcmaster.ca). Please direct any questions about acceptable documentation to the MBA Academic Advisors (askmba@mcmaster.ca).

University policy states that a student may submit a **maximum of three (3)** Petition for Missed Term Work per academic year, after which the student must meet with the Director of the program.

If term work is missed without an approved reason, students will receive a grade of zero (0) for that component.

Missed Final Examinations

Students must be available for the duration of the posted exam period regardless of their personal exam schedule. This is to ensure student availability throughout the entire exam period in the event that an exam must be rescheduled due to unforeseen circumstances (university closure, power outage, storm policy, etc.). A student who misses a final examination without valid reason will receive a mark of 0 on the examination.

Students who have missed a final exam for a valid reason can apply to the DSSAO ([DSB Student Services Academic Office](#)) to write a deferred examination by submitting an [Application for Deferring a Final Exam](#) with supporting documentation. The application must be made **within five days** of the scheduled exam.

The [Application for Deferring a Final Exam](#) and the [MBA Student McMaster University Student Health Certificate](#) can be found on the DeGroote MBA Current Student website (mbastudent.degroote.mcmaster.ca)

Deferred examination privileges, if granted, are normally satisfied during the deferred examination period as set by the [Office of the Registrar](#).

Requests for a second deferral or rescheduling of a deferred examination will not be considered.

ACADEMIC ACCOMMODATION FOR STUDENTS WITH DISABILITIES

Student Accessibility Services (SAS) offers various support services for students with disabilities. Students must activate their accommodation(s) (e.g., extra-time, alone room, etc.) via [mySAS](#) portal at the beginning of each term, normally, within the first three (3) weeks of classes. If a student with a disability chooses NOT to take advantage of an SAS accommodation and chooses to sit for a regular exam, a petition for relief may not be filed after the examination is complete. The SAS website is:

<http://sas.mcmaster.ca>

Use of Test Accommodations at McMaster University Burlington Campus Ron Joyce Centre

Whereas Student Accessibility Services (SAS), on Main Campus, determines all MBA student accommodations, the MBA Faculty Office manages the coordination of accommodations for tests, midterms, and exams at the Ron Joyce Centre in Burlington.

Process for Students

- Student Accessibility Services (SAS) now uses the online [mySAS](#) Portal for graduate students to share accommodation letters with their instructors and Faculty/Program. Students are responsible for activating their accommodations each term through the [mySAS](#) Portal. Once activated, an approved accommodation letter will be automatically sent to the instructors associated with the student's enrolled courses for that term.
- Students must engage the DSSAO (DSB Student Services Academic Office) to implement their accommodation(s) (e.g., extra-time, alone room, etc.) for each upcoming test, midterm, or exam, at **least two weeks in advance**. Students can do this by emailing DeGroote MBA SAS scheduling office at DSBSAS@mcmaster.ca or completing the [Accommodation Implementation form](#). If a student cannot meet this deadline, they should contact DSBSAS@mcmaster.ca to discuss alternative arrangements. The program is committed to exploring flexibilities where possible to support students.
- All tests, midterms, and exams are booked synchronously with the class's start time. Any deviations from the start time (e.g. start earlier than the class to enable completion at the same end time) requires a discussion with their instructor on protocol at the time of accommodation activation.
- Students will leverage the accommodation (e.g., extra-time, alone room, etc.), in a designated testing room. Rooms will be booked according to the student's SAS accommodation. Unless the accommodation states otherwise, students should expect that they will be writing in a room with other students. One or more invigilators will always be in the room.
- Following the request to implement the accommodation(s), dsbsas@mcmaster.ca will reach out to the student with their test, midterm, or exam details, including the date, time, and room number. As there may be other students writing tests in the room, we ask that students enter the room quietly and leave all personal items at the front of the room.

All policies and procedures, including restroom access, how extra-time is allocated for assessments under Universal Design, and the submission of memory aids in advance, are consistent with those of SAS on Main Campus. The only variance in procedure is communication around, and physical location of, assessment. There is not a dedicated testing space at RJC. Existing classrooms and



lecture halls will be used for most testing. All SAS-approved accommodations will be honoured by our staff; however, core testing elements are not eliminated in alternative testing formats. Students should expect and plan for invigilation, incidental noise, and other potential distractions.

ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to the DSSAO (DSB Student Services Academic Office) ***normally within 10 working days*** of the beginning of term in which they anticipate a need for accommodation. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

COPYRIGHT AND RECORDING

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors.

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

POTENTIAL MODIFICATION TO THE COURSE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

RESEARCH USING HUMAN SUBJECTS

ONLY IF APPLICABLE

Research involving human participants is premised on a fundamental moral commitment to advancing human welfare, knowledge, and understanding. As a research intensive institution, McMaster University shares this commitment in its promotion of responsible research. The fundamental imperative of research involving human participation is respect for human dignity and well-being. To this end, the University endorses the ethical principles cited in the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans:

<http://www.pre.ethics.gc.ca>

McMaster University has mandated its Research Ethics Boards to ensure that all research investigations involving human participants are in compliance with the Tri-Council Policy Statement. The University is committed, through its Research Ethics Boards, to assisting the research community in identifying and addressing ethical issues inherent in research, recognizing that all members of the University share a commitment to maintaining the highest possible standards in research involving humans.

If you are conducting original research, it is vital that you behave in an ethical manner. For example, everyone you speak to must be made aware of your reasons for eliciting their responses and consent to providing information. Furthermore, you must ensure everyone understands that participation is entirely voluntary. Please refer to the following website for more information about McMaster University's research ethics guidelines:

<http://reo.mcmaster.ca/>

Organizations that you are working with are likely to prefer that some information be treated as confidential. Ensure that you clarify the status of all information that you receive from your client. You **MUST** respect this request and cannot present this information in class or communicate it in any form, nor can you discuss it outside your group. Furthermore, you must continue to respect this confidentiality even after the course is over.

ACKNOWLEDGEMENT OF COURSE POLICIES

Your registration and continuous participation (e.g. on A2L, in the classroom, etc.) in the various learning activities of BUSADMIN O712 will be considered to be an implicit acknowledgement of the course policies outlined above, or of any other that may be announced during lecture and/or on A2L. It



is your responsibility to read this course outline, to familiarize yourself with the course policies and to act accordingly.

Lack of awareness of the course policies **cannot be invoked** at any point during this course for failure to meet them. It is your responsibility to ask for clarification on any policies that you do not understand.

ARTIFICIAL INTELLIGENCE

Students are permitted to use AI tools to assist with course assignments. Each submission must include:

- Explanation how AI was used in the work.
- The prompts you used to generate content

You may not ask an AI tool to read, summarize, or modify another student's solution, and you remain fully responsible for the accuracy of everything you submit — an error produced by an AI tool is your error.

Refer to this page for additional information and guidelines: [Generative Artificial Intelligence - Academic Excellence - Office of the Provost \(mcmaster.ca\)](#)

COURSE SCHEDULE

BUSADMIN O712
Data Analytics with Python
Fall 2026 Course Schedule

WEEK	DATE	TOPIC	DELIVERABLE
1	September 8	Introduction to Business Analytics Setup of Tools	
2	September 15	Python Basics for Business Analytics	
3	September 22	Data Acquisition and Manipulation	
4	September 29	Data Preparation and Cleaning	Assignment #1
5	October 6	Exploratory Data Analytics and Visualization	Project Proposal Presentation
6	October 13	Predictive Analytics I	
7	October 20	Predictive Analytics II	
8	October 27	Predictive Analytics III	Assignment #2
9	November 3	Midterm (in class)	
10	November 10	Pattern Recognition and Diagnostics I	
11	November 17	Pattern Recognition and Diagnostics II	Assignment #3
12	November 24	From Prediction to Decision	
13	December 1	Group Project Presentations	Group project report Assignment #4 (due later in the week)